

ABSTRACT

Piezo-electric ceramic transducer 1 has upper piezo-electric active layer 5 and lower piezo-electric active layer 6. Upper insulating layer 2 and lower insulating layer 3, between which upper 5 piezo-electric active layer 5 and lower piezo-electric active layer 6 are placed, are disposed on both surfaces of piezo-electric ceramic transducer 1 in a thickness direction thereof. Two electrode pads 8 and 9 are disposed on a surface of upper insulating layer 2. Electrode pads 8 and 9 are connected with upper electrode layers 7a 10 and lower electrode layers 7b via connection members 12, and voltages are applied to upper piezo-electric active layer 5 and lower piezo-electric active layer 6 via electrode pads 8 and 9. Insulating layers 2, 3 and 4 and piezo-electric active layers 5 and 6 are made of the same material as one another and are integrated by sintering.